

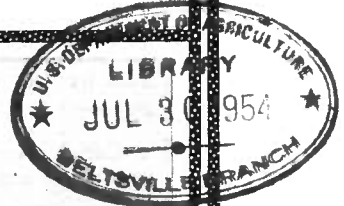
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U. S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN No. 1050



HANDLING *and* LOADING SOUTHERN NEW POTATOES



MUCH of the loss in southern new potatoes in transit and in the markets is caused by field cuts and bruises and by the practice of allowing the potatoes to remain exposed to the sun after digging.

Careful grading will increase the grower's profits and will make a surer and more constant market for his product.

Cars should be loaded according to a definite plan. Loaders should obtain the maximum amount of ventilation throughout the load and avoid methods that allow shifting and breakage in transit.

The double-headed barrel is the most satisfactory package for new potatoes. The heads should be secured by "headliners." The barrels should conform to the specifications of the United States standard barrel. Barrels which are loaded on end carry better than those loaded on their sides.

Cloth-topped barrels do not protect their contents as effectively as those having double heads.

Sacks do not sufficiently protect new potatoes from cuts and bruising. If they are used, those holding from 90 to 120 pounds are the most desirable from the standpoint of careful handling and ventilation of the contents.

Hampers should not be used for the shipment of potatoes.

If crates are used they should be so made as to protect the potatoes from too rapid evaporation and consequent shriveling.

Packages should be marked with the weight or dry measure of their contents.

If stock cars are used, it is generally advisable to protect the potatoes from the sun and weather by lining certain of the open parts with strong building paper.

HANDLING AND LOADING SOUTHERN NEW POTATOES

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COMMERCIAL IMPORTANCE OF THE SOUTHERN NEW POTATO CROP

THE SOUTHERN NEW POTATO is an important and valuable perishable crop. A crop of such importance, of so great food value, and yet of so perishable a nature is certainly worthy of enough care in harvesting and handling to insure the minimum of waste. Growers and shippers have not yet given this matter the consideration it deserves.

The importance and value of the southern potato crop may be estimated from the following figures, which give the carload shipments during the 1925 and 1926 seasons from representative potato-growing States of the South.

TABLE 1.—*Carload shipments of southern potatoes*^a

State	Season	1925 season	1926 season
Alabama.....	May 1 to July 31.....	1,046	2,216
Arkansas.....	May 25 to July 31.....	537	352
Florida.....	Mar. 15 to July 15.....	5,138	4,820
Georgia.....	May 15 to June 30.....	255	353
Louisiana.....	May 1 to July 31.....	1,280	1,415
Maryland (Eastern Shore), first crop.....	June 15 to Sept. 30.....	1,463	1,918
Mississippi.....	May 1 to July 31.....	30	40
North Carolina.....	Mar. 15 to Aug. 31.....	4,040	6,690
Oklahoma.....	June 1 to Nov. 30.....	2,335	2,117
South Carolina.....	May 1 to June 30.....	3,674	5,181
Tennessee.....	June 1 to Dec. 31.....	249	307
Texas.....	Apr. 15 to Aug. 15.....	1,424	1,990
Virginia (Eastern Shore), first crop.....	June 1 to Sept. 30.....	12,580	12,153
Virginia (Norfolk), first crop.....	June 1 to Sept. 30.....	3,094	4,018
Total.....		37,145	43,570

^a Includes all delayed and corrected reports received to Nov. 18, 1926.

¹ The author of this bulletin died October 18, 1918. The bulletin has been revised by R. R. Pailthorp, marketing specialist, Bureau of Agricultural Economics.

HOW TO AVOID LOSSES IN DIGGING POTATOES

Large losses of southern potatoes result from injurious practices at the time of digging. Through carelessness, lack of labor, or other cause, many growers allow their potatoes to lie exposed to the hot sun for many hours after they are dug, and potato scald develops. Potatoes so affected are often called "cooks," and, although the damage may not be evident at the time of packing, the injured potatoes usually develop soft rot and become mushy and worthless during transit or soon after their arrival at market. (Fig. 1.) Potatoes should not be dug more rapidly than they can be picked and placed in the shade. If possible, it is even better to dig only



FIG. 1.—Culls sorted out by expensive labor, which had to handle every potato in this car from a Southern State. This would have been avoided if the grower and shipper had used reasonable care

during the cooler parts of the day, so that the potatoes can be placed in a shady spot without exposure to severe heat. This is a general practice in some sections of the country.

Whether potatoes are dug with hoes, plows, or machines, care should be taken to reduce the number of field cuts. These offer an entrance for disease, besides damaging the appearance and causing waste. The majority of the fungous diseases that cause decay of potatoes and other vegetables can not develop when the skin is free from cuts and bruises. Careful handling is fundamental, therefore, for the prevention of deterioration and waste. Probably no single factor is as important to proper handling, and none is more generally ignored by the average grower or by the labor which he employs.

WHY IT PAYS TO GRADE POTATOES

Ungraded and poorly graded stock also cause heavy losses. In the first place, ungraded potatoes can not compete with graded stock on the market, except at a sacrifice in price. The dealer who buys such potatoes has to sell them at a lower price than well-graded stock will bring or he must grade them himself. In either case he pays the farmer less, and the producer and consumer ultimately pay the freight, labor, and loss on the culls.

The farmer would further his own interests by grading his potatoes, obtaining higher prices for the good grades, and feeding the culls to his livestock. Where an individual farmer does not grow enough potatoes to warrant the investment necessary for a good sizer, it is often possible for him to purchase one in cooperation with his neighbors. Sizing by hand has not proved a success, except where rigid inspection is practiced. Farmers' cooperative associations that grade, load, and sell the potatoes of their members are operating successfully in many districts.

The term "potato grader" as applied to the mechanical sizer is misleading. The use of a sizing machine does not necessarily insure a good grade of potatoes unless it is operated very carefully. The potatoes should be fed evenly to the sizing machine and the quantity should not be beyond the capacity of the sizer to separate accurately. When an unduly large quantity of potatoes is dumped on the machine at one time the smaller potatoes often ride on top of the No. 1 size into the No. 1 container. A large quantity of potatoes on the machine at one time causes careless sorting, without satisfactory removal of diseased and injured potatoes.

Size is not the only factor in securing a good grade. Grading should eliminate all potatoes that are cut and bruised and all that are diseased, because such potatoes do not carry in good condition to market, and they detract from the general appearance of the lot. An injured potato has lost its protection against disease and is the largest source of transit loss by decay. Field injury should be reduced to a minimum, and the injured potatoes should be eliminated at the sizing machine along with those which are diseased, undersized, or otherwise undesirable.² A diseased potato may be a source of infection to others while in transit or in storage, and in any case detracts from the salability of the lot. There should be at least one man at the machine who is employed exclusively to pick out all culls. (Fig. 2.)

AVOID LOSSES CAUSED BY SHIPPING DISEASED AND BRUISED POTATOES

Losses at the large markets are exceptionally heavy some seasons because of the prevalence of late blight, brown rot, fusarium, and other diseases in the South. (Fig. 3.) One of the worst features of these diseases is that they provide an entrance for bacteria of various kinds. These bacteria cause foul-smelling soft rots during transit, which quickly spread through the whole car and in many cases make the potatoes unsalable except at a heavy loss. Although diseases of this nature can be effectively prevented by proper seed treatment,

² Dropping the potatoes from the sizing machine into barrels or crates causes further injury if the fall is not broken.



FIG. 2.—Grading potatoes on a Florida farm

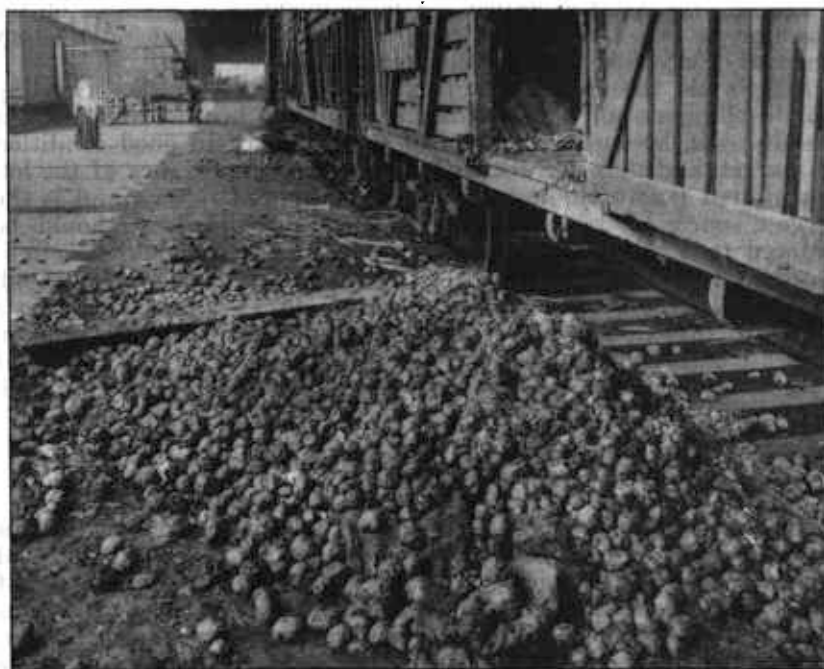


FIG. 3.—Part of the waste from a carload of potatoes at Chicago. This waste can be prevented

spraying, or other means, a little extra care at the time of packing may be the means of preventing heavy losses on the market.

Bruising is a common cause of loss in new potatoes. Bruising may be caused either by poor handling methods or by poor containers. Frequently potatoes are thrown on the sizer too roughly; sometimes sacks are dropped from a height, as shown in Figure 4; and often the car loaders drag the sacks over the car floor or even walk over the potatoes. It should always be borne in mind that new potatoes are tender and easily bruised. Bruising has a direct effect on the decay developing in transit and the price received at market.

USE THE PROPER METHOD OF LOADING CARS

The following recommendations for loading cars of new potatoes are based on investigations carried on at the more important shipping points in the South, and on the inspection of several hundred



FIG. 4.—Dropping sacks of potatoes onto an elevator. Such rough handling causes bruising

cars of southern potatoes in New York, Philadelphia, Pittsburgh, Chicago, St. Louis, Kansas City, Cincinnati, Cleveland, Detroit, Louisville, and elsewhere. They take into account, in addition, the experiences of successful potato shippers and receivers.

BARRELS

The double-headed ventilated barrel shown in Figure 5 appears to be the most satisfactory package now in general use for potatoes. If properly made, it is strong enough to carry the weight of its contents and fully protect the potatoes.

There is much less breakage in cars where the barrels are loaded on end than when loaded on the bilge. When loading on end, place five barrels across the end of the car. These will practically fill the width of the car, and there will be 105 barrels in each layer of a 36-foot car. Lay strips of wood on top of these barrels and place the second layer of barrels directly on top of the first row. Continue

this method throughout the car, taking great care to keep the barrels tight against one another.

There is one serious objection to loading barrels on end. In some cases, owing to jolting in transit, they appear to be of slack measure when they arrive at the market. This fault can be largely eliminated if growers will fill their barrels well, shaking them down repeatedly while filling, and using a press when heading.

Boards 1 by 6 inches or slab wood not less than $1\frac{1}{2}$ inches thick at the center should be nailed to the doorposts inside each doorway to prevent the barrels from bulging the doors or falling out of the car. In odd-sized cars it may be necessary to load the barrels in the doorway on their bilge in order to make a tight load. (Fig. 6.) Loading barrels on their bilge is not a safe practice unless "headliners" (strips to prevent the heads from bulging) are used. (Fig. 7.) Records show that practically every car loaded on the



FIG. 5.—Double-headed ventilated barrels loaded on end. Strips should have been placed between the layers in this load

bilge without headliners has from 3 to 30 or more barrels crushed and broken on arrival at the markets. This breakage has proved to be as bad in lightly loaded as in heavily loaded cars.

The cloth-topped barrel carries best when loaded on end as described for double-headed barrels, but when the second layer is placed on top there is considerable bruising of the top potatoes of the lower barrels.

When the cloth-topped barrel is loaded on its bilge, the weight of the load is thrown upon the potatoes themselves, resulting in considerable crushing and bruising. (Fig. 8.)

Slat or veneer barrels are too flimsy for potatoes. They crush and break easily and should not be used for heavy produce.

SACKS

The sack is not as suitable a container for tender new potatoes as the barrel. It offers less protection from bruising and makes a load

that is difficult to ventilate, but it has the advantage of being cheaper than barrels or crates.



FIG. 6.—Barrels loaded on their hidge crosswise of the car. The barrels on the fourth layer should have been against the wall on the right

When sacks are used it is best to use only new ones. Secondhand sacks present an unattractive appearance on the market and the



FIG. 7.—Barrels loaded on their bilge lengthwise of the car. If barrels are loaded on their bilge, "headliners" should be used

original contents may have a detrimental effect on the quality and condition of the potatoes shipped.

Sacks should be of no greater capacity than 120 pounds, since the smaller sack can be handled with much greater care than a larger sack and it lends itself better to adequate ventilation of the shipment. To load sacks in any car without provision for ventilation throughout the load is to invite loss. (Fig. 9.) Loads similar to that shown in Figure 9 are rather common in certain sections and are the cause of heavy losses of new potatoes.

One hundred and fifty pound sacks are not desirable, but as they are used frequently the following method of loading them, illustrated by Figure 10, is recommended. Place the first sack on end in one corner of the car with the flat side leaning against the side of the car. Make sure that the bottom of the sack is at least 6 inches from the side of the car. Lean two more sacks against the first. (The bottom of the last sack should come nearly to the center line of the car.)



FIG. 8.—What happens when barrels are loaded on their bilge. Characteristic breakage in a car of double-headed barrels. The heads give way and the barrels collapse from the weight above, causing bruising and mashing of the potatoes

On top of these three sacks place one sack flat, taking care to keep one end at least 10 inches from the side of the car and the other end well on top of the upright sack nearest the center line. Another sack should be placed flat on top of this, but with one end tight against the side of the car. The manner in which these two flat sacks are loaded is very important, for if they are not correctly and securely placed the load is practically certain to shift in transit.

Exactly the same method is followed on the opposite side of the car. This gives a load of 10 sacks to the stack across the car with an open V-space in the center for ventilation. By following this plan, nine stacks can be placed in each end of a 36-foot car from the end wall to the doorframe. When the doorway is reached, three strips 6 inches wide should be nailed across the opening, the sacks being loaded against these strips in the same way as in the ends of the car. The important points are to prevent the sacks from jam-

ming the doors and to avoid their blocking the aisle, thereby cutting off ventilation. None of the other methods of loading in common use obtain as good results.



FIG. 9.—Car loaded in such a way that no ventilation can reach the center of the load. This car was badly overheated when it arrived at destination

Sacks ranging from 90 to 120 pounds are loaded in the same way as the 150-pound size, except that both the layers of sacks which are laid flat extend entirely across the three upright sacks beneath and touch the side wall of the car. (Fig. 11.) When small sacks are used, it may be necessary to modify slightly the above load to get a

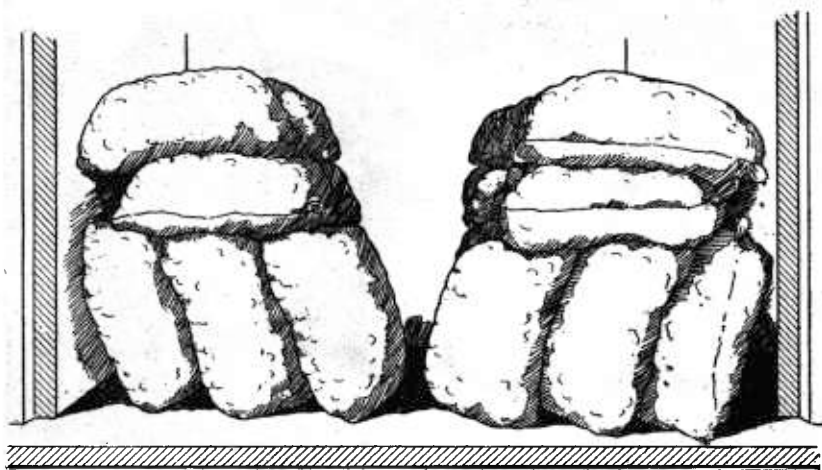


FIG. 10.—The most satisfactory method of loading 150-pound sacks

minimum carload. The most satisfactory method to accomplish this is to use one more upright sack in each stack, as illustrated in Figure 12. It should be cautioned again that placing sacks in the V-shaped

opening left for ventilation from end to end of the car retards air passage to such an extent that overheating results.



FIG. 11.—Loading 90 to 120 pound sacks. This car is well loaded

In some sections of the South it is the usual practice to load cars of sacked potatoes in two rows of five layers placed flat along each side of the car, as shown in Figure 13. Market inspections have



FIG. 12.—A variation of the standard load. Loading 100-pound sacks to secure a heavy-weight shipment with the greatest amount of ventilation

shown clearly that this type of load is extremely unsatisfactory. (1) It causes considerable bruising; (2) overheating results from the poor ventilation between the sacks; and (3) the load seldom

remains in place during transit, but shifts as shown in Figure 14, causing further bruising and overheating.

HAMPERS

Hampers are not suitable packages for potatoes. They do not have the necessary strength for the weight of their contents and they afford little protection. As long as hampers are used for potatoes and other heavy produce, severe losses from breakage in transit will ensue. (Fig. 15.)

If hampers, for any reason, must be used they should be loaded on end with alternate baskets inverted. Great care should be taken to make the load tight with no slack space either endwise or across the car. This precaution will lessen but will not entirely prevent shifting.

The practice of loading hampers on their sides can not be too severely condemned. Complete and careful inspections show that in cars loaded in this way an average of fully 60 per cent of the hampers are more or less crushed and broken on arrival at market, with consequent severe damage to their contents. (Fig. 15.)



FIG. 13.—This load will not carry safely. Loading sacked potatoes one row with five layers of sacks placed flat along each side of the car

CRATES

Crates of various kinds are used for new potatoes and are satisfactory when of sufficient strength. Weak or poorly constructed crates should not be used under any circumstances. Crates with large spaces between the slats tend to allow the potatoes to shrivel in transit, and are objectionable for this reason. At present, the chief objection to the crate is, that since the market cities are not accustomed to this style of package the potatoes are likely to sell for less than those put up in other containers. They make an attractive car when properly loaded, and this prejudice should disappear.

In loading crates care should be taken to make the load tight and firm, especially from end to end of the car. No slack space should be left under any circumstances without suitable bracing. The crates should be held in place with car strips.

TYPES OF CARS

Good types of ventilated box cars and stock cars are suitable for shipping new potatoes when loaded correctly. Refrigerator cars moving under ventilation have been recently used for many shipments from Virginia and Maryland. When the potatoes are sound and of good quality 30,000 pounds is a safe load.

Double-decked stock cars are used in some sections and can be safely loaded by placing one solid layer standing upright on each



FIG. 14.—Shifting like this damages the potatoes. Appearance of car loaded as shown in Figure 13 on arrival

deck. Sacks should not be loaded too tightly against one another. Sacks are occasionally cut open and potatoes stolen through the slats of stock cars while en route. There is also some danger of damage by rain, sunburn, and shriveling. As a protection from the weather, the open parts of stock cars should be lined with strong building paper.

California summer shipments, as well as those from other western territories, have been made "under ice" in refrigerator cars during the last few years. The shippers are almost unanimous in stating that the additional cost of icing is much more than repaid by the improved condition of the potatoes on arrival. When the practice was first started there was considerable objection by the receivers, who thought the stock would go down rapidly on withdrawal from

the cars. Shippers from Stockton, Calif., say that this objection proved to be unfounded and that they now refuse to ship new potatoes without ice in most cases unless the receiver takes all risk. This method should receive a fair trial in other sections.

ADDITIONAL POINTS TO BE REMEMBERED

A service and regulatory announcement issued by the Bureau of Chemistry in 1923,³ states that "potatoes in barrels, crates, and hampers, and in sacks of uniform quantity of contents" under the net-weight amendment to the food and drugs act, should "be marked by weight or dry measure, or when packed in barrels, in terms of the United States standard barrel and its lawful subdivisions, i. e., third, half, or three-quarters."



FIG. 15.—Do not ship potatoes in hampers. Breakage and damage in a car of hampers loaded on their sides

It is required by law⁴ that the barrels used for the shipment of potatoes shall have the following dimensions:

LEGAL DIMENSIONS FOR POTATO BARRELS

	Inches
Length of stave.....	28½
Diameter of heads.....	17½
Distance between heads.....	26
Circumference of bilge, outside measurements.....	64
Thickness of staves not greater than.....	1½

Provided that any barrel of a different form having a capacity of 7.056 cubic inches shall be a standard barrel.

The terms used in describing methods of loading cars are defined as follows:

Layer.—A course or stratum of the load in a car, one package in height, shall be known as a layer.

Stack.—A pile of packages extending from one side of the car to the other, one package in length, shall be known as a stack.

Row.—A pile of packages extending lengthwise of the car, one package in width, shall be known as a row.

³ U. S. Dept. Agr., Bur. Chemistry. Service and Regulatory Announcement No. 28. 1923.

⁴ Public, No. 307, 63d Cong., approved Mar. 4, 1915.

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March 24, 1927

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